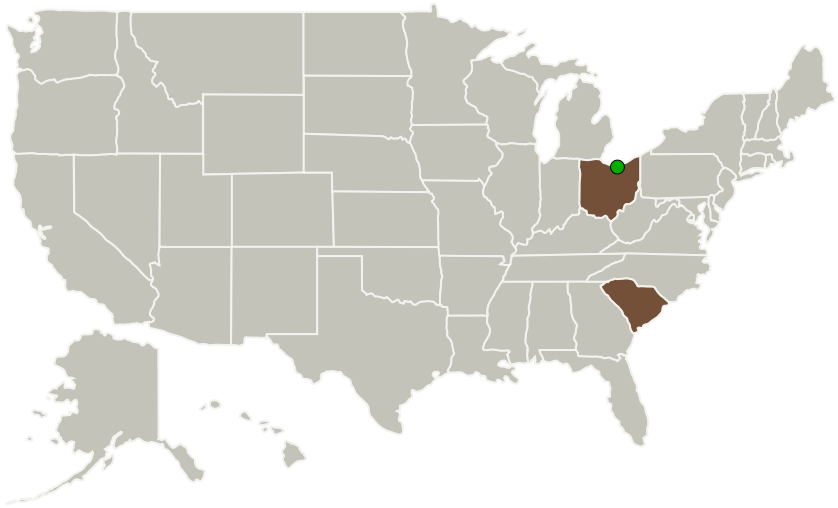
Fabrication of T-SOFC via Freeze Cast Methods for Space and Portable Applications, Phase II

Completed Technology Project (2015 - 2017)

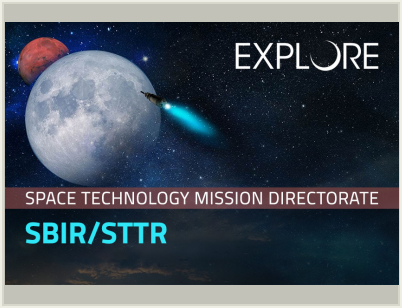
Project Introduction

As NASA space missions become longer in duration the need for high efficiency power generator sets that can operate on NASA logistical fuel become critical. Historically NASA has used fuel cells as part of the energy solution. Space bound energy and power systems require rapid start and stop cycle times as well as high power densities. The high operational efficiency, coupled with the use of logistical fuel options make fuel cells vital to the extended future missions of NASA. Solid Oxide Fuel Cells (SOFCs) have been demonstrated on a variety of gaseous and liquid hydrocarbon fuels. Our team has developed tubular SOFC systems capable of cycling from room temperature to 700C and full power in less than 15 minutes. The system has been cycled more than 250 times and demonstrated life times greater than 2000hrs. Coupling the freeze cast microstructure with the rapid cycling and portability of the tubular systems will lead to a high power density robust SOFC system operating on methane and oxygen capable of space missions.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Yanhai Power, LLC	Lead Organization	Industry	Irmo, South Carolina
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio



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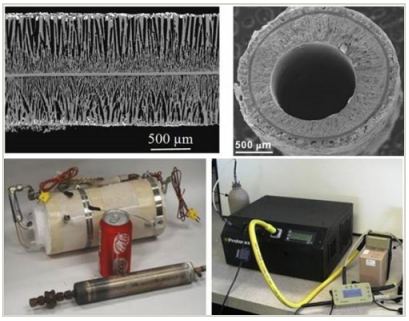
Primary U.S. Work Locations	
Ohio	South Carolina

Images



Briefing Chart
Fabrication of T-SOFC via Freeze Cast Methods for Space and Portable Applications Briefing Chart *(https://techport.nasa.gov/image/129021)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Yanhai Power, LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Benjamin Emley

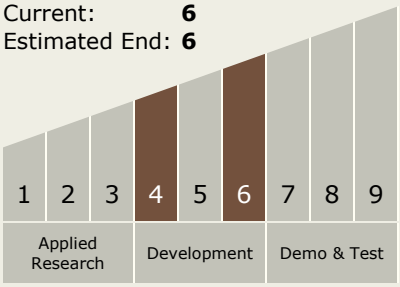
Co-Investigator:
Benjamin Emley

Fabrication of T-SOFC via Freeze Cast Methods for Space and Portable Applications, Phase II

Completed Technology Project (2015 - 2017)

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.4 Dynamic Energy Conversion

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System